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OPERATOR'S MANUAL

MODEL 890
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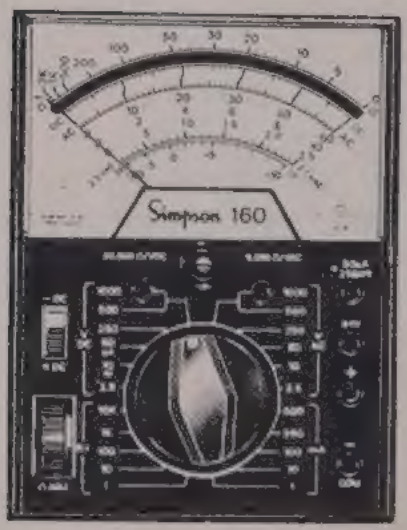

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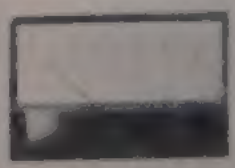

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OPERATOR'S MANUAL

MODEL 890
SOUND LEVEL CALIBRATOR

SIMPSON ELECTRIC COMPANY

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Area Code 312, Telephone 697-2260
In Canada, Bach-Simpson, Ltd., London, Ontario

Printed in U.S.A.
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Part No. 5-117227

Figure 1-1. Simpson Model 890 Sound Level Meter

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SECTION I

INTRODUCTION

WARNING

Never place the operating callibrator tightly against the ear. The high sound level present could be harmful, especially to someone with a hearing deficiency.

1.1 GENERAL

1.1.1 The Simpson Model 890 Sound Level Calibrator (hereinafter referred to as Model 890, or simply the Instrument) is an accurate, portable, sound source designed specifically for convenient field calibration of the Simpson Models 884 and 886 Sound Level Meters and other compatible microphone-instrument systems. Compact, rugged construction and battery powered operation permit use in virtually any location.

1.1.2 When acoustically coupled to a Model 884 or 886 Sound Level Meter, the Model 890 provides a constant, calibrated sound pressure level of 114 dB (0 dB reference is 20 micronewtons per square

meter) at the microphone of the Sound Level Meter. The sound pressure accuracy is 0.5 dB at 23°C and 760 mm Hg (see Figure 4-1). The sound frequency of 1000 Hz allows calibration with A, B or C weighting networks since these weightings have the same response at 1000 Hz. The case of the Instrument is constructed of aluminum and designed to minimize loss when coupling the transducer cavity to the Sound Level Meter microphone.

1.1.3 The Model 890 uses only one control, a three position slide switch (see Figure 3-1). This switch provides quick selection of power OFF/ON and battery test functions. In the BATT TEST position, a red light-emitting-diode (LED) lights to indicate adequate battery voltage.

1.1.4 The use of advanced, solid-state electronics, a careful choice of components and a special sound transducer achieve a rugged, stable design with excellent reliability and immunity to normal temperature and humidity changes.

1.2 SUPPLIES AND ACCESSORIES

All items required for operation of the Model 890 are furnished with the Instrument and listed in Table 7-1.

1.3 TECHNICAL DATA

Table 1-1 lists the technical specifications for the Simpson Model 890 Sound Level Calibrator.

Table 1-1. Model 890 Technical Data

1.	**Acoustic Output:**	
	Frequency:	1000 Hz±1%
	Sound Pressure Level:	114 dB (Reference: 0 dB = 20 μn/m^2)
2.	**Accuracy:**	±0.5 dB at reference conditions
3.	**Distortion:**	Less than 1%
4.	**Temperature Range:**	0°C to +50°C
5.	**Output Temperature Coefficient:**	Less than minus 0.05 dB/°C
6.	**Operating Relative Humidity:**	0 to 90%
7.	**Power Requirements:**	One 9-volt battery, NEDA 1604.

8. Battery Life:	Approximately 35 hours for 2 hours per day operation.
9. Reference Conditions:	23°C, 760 mm Hg and 30% to 60% relative humidity.
10. Mechanical Construction:	Aluminum case includes acoustic cavity and provides shielding. Electronic circuits are packaged on a single printed-circuit board.
11. Weight:	13.5 oz. (.35 kg)
12. Dimensions:	5-1/4" long, 2" diameter (131 mm long, 50 mm diameter)

SECTION II

INSTALLATION

2.1 UNPACKING AND INSPECTION

2.1.1 Examine the shipping carton for obvious signs of damage prior to unpacking. If shipping carton is in good condition, then unpack and inspect the Instrument for possible damage incurred during shipment. If damage is noted, notify the carrier and supplier and do not attempt further use of the Instrument. If Instrument appears to be in good condition, read Operator's Manual in its entirety. Become familiar with the Instrument as instructed in the manual, then proceed to check the electrical performance as soon as possible. Also, check that all items are included with the Instrument (see Table 7-1).

2.1.2 Save the shipping carton and packing materials for storing or future shipping of the Instrument.

2.2 POWER REQUIREMENTS

The Model 890 is powered by one 9 volt battery (supplied). Refer to Table 1-1, items 7 and 8, for description and paragraph 6.4 for installation. The battery is packaged separately.

2.3 INSTALLATION

The Calibrator can be hand-carried and operated in any position. In actual use, both the Calibrator and the Sound Level Meter can be hand held (refer to Figure 4-2).

NOTE: The accuracy of calibration will be affected if the Calibrator is not mated properly to the Sound Level Meter. Refer to Table 3-1, item 4.

SECTION III

CONTROLS, CONNECTORS AND INDICATORS

All the controls, connectors, indicators and other operational items are described in Table 3-1. Become familiar with each before operating the Instrument for the first time. See Figure 3-1.

Table 3-1. Controls, Indicators and Other Operational Items

1. Battery Cap	This is an aluminum cap which screws onto one end of the Instrument housing. It provides easy access to the battery compartment and also holds battery firmly in position (refer to paragraph 6.4).
2. BATT TEST Indicator (LED)	When the function switch is held in the BATT Test position, a small light-emitting-diode (LED) indicator will light if the battery condition is adequate to provide the specified sound pressure level of 114 dB.
3. OFF-ON-BATT TEST	This is a three-position slide switch. In the OFF position, the internal battery is disconnected from the electronic circuits. In the ON (center) position the battery power is applied to the electronic circuits. In the BATT TEST position, the battery is disconnected from the sound generating circuits and connected to a battery test circuit. The BATT TEST position is a momentary position; when released, the switch returns automatically to the ON position.

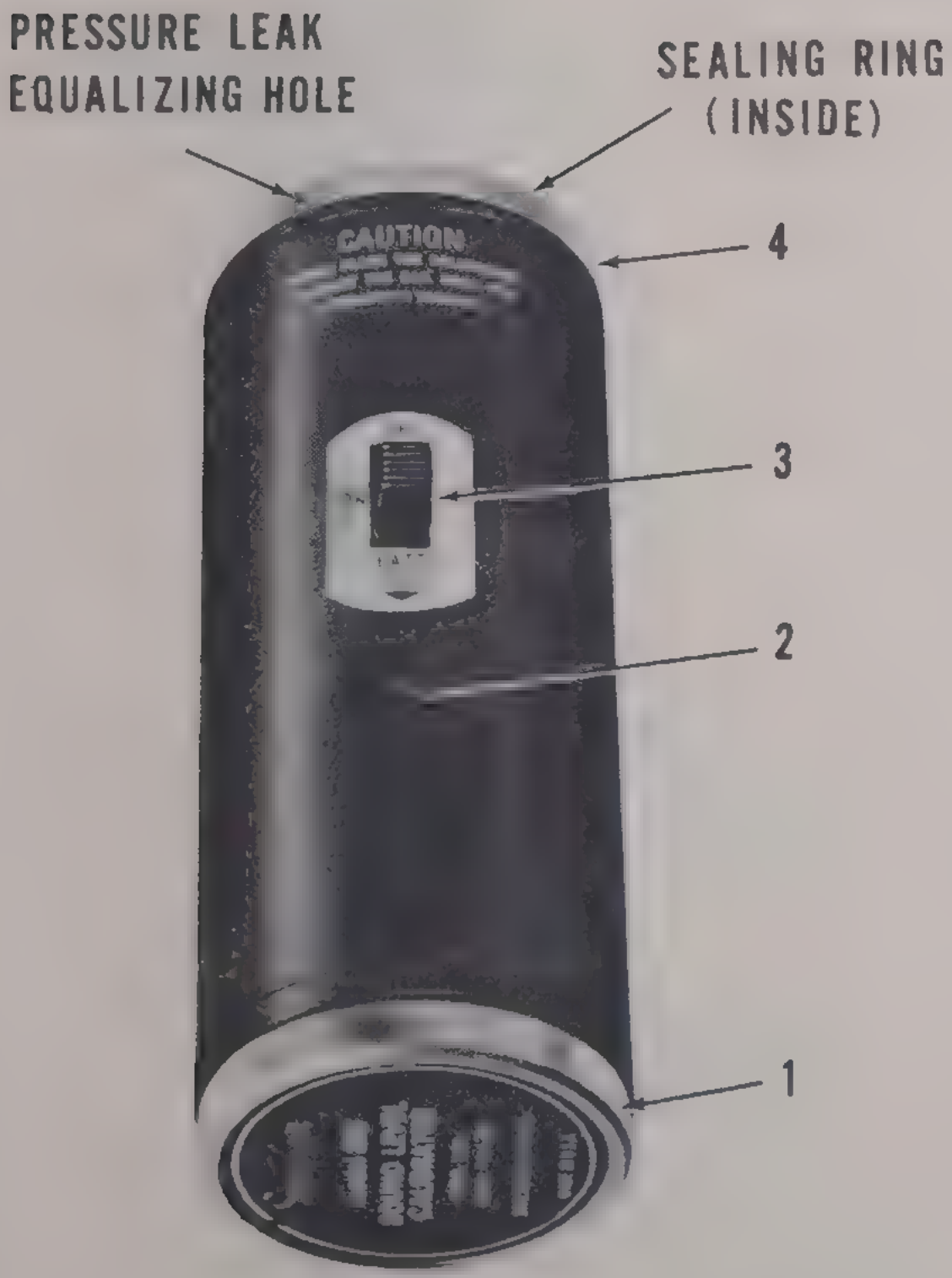

Figure 3-1. Model 890, Controls Description

4. Transducer Cap

This is a precisely machined cap which screws onto the other end of the housing. The mating of the transducer cap, and the microphone of the Sound Level Meter being calibrated, constitutes an acoustic coupler. The cap includes a sealing ring to ensure a closed cavity between the cap and Sound Level Meter microphone, and a small hole on the side to provide a controlled leak to atmosphere.

SECTION IV

OPERATION

4.1 GENERAL

This section contains the instructions required for operation of the Model 890. Follow these instructions and the Operator's Manual of the Models 884 and 886 Sound Level Meters, to ensure correct operation of the Model 890 and accurate calibration of the Sound Level Meter.

4.2 PRECAUTIONS

4.2.1 The Model 890 is intended for use in conjunction with Simpson Models 884 and 886 Sound Level Meters. Contact the factory for possible use with other sound level meters.

4.2.2 When the Model 890 is turned on, a 1000 Hz tone is audible and there is a natural tendency for the operator to bring the Instrument against the ear.

WARNING

Never place the operating callibrator tightly against the ear. The high sound level present could be harmful, especially to someone with a hearing deficiency.

4.2.3 Carefully review and become thoroughly familiar with the contents of the Operator . Manual for the Model 884 or 886 Sound Level Meter (precautions, operating notes, specifications, etc.).

4.2.4 Check the calibration of the Model 890 periodically or whenever accuracy is doubted. For example, inspect the Instrument for evidence that might indicate that it has been subjected to severe

mechanical shock or environmental extremes. This check can be made by comparison with another Model 890 Calibrator, or with a reference Model 884 Sound Level Meter known to be accurate. If another Model 890 or reference Sound Level Meter is not available, return the Instrument to a Simpson Authorized Service Center, or to the factory, for complete, overall check.

4.2.5 Be sure the sealing ring in the transducer cap is not damaged and that the leak-to-atmosphere hole is not clogged. Refer to Table 3-1, item 4.

4.3 EFFECTS OF ATMOSPHERIC PRESSURE AND TEMPERATURE

4.3.1 For any one location, the effects of normal variations of atmospheric pressure are usually negligible. The effect of elevation is shown in Figure 4-1. This graph shows the change in Instrument output level compared to that obtained at sea level. For example, if the Instrument is being used at 5000 feet, calibrate the Sound Level Meter for an indication of 113.75 dB.

4.3.2 The effects of temperature are less than −0.05 dB/°C (reference is 23°C).

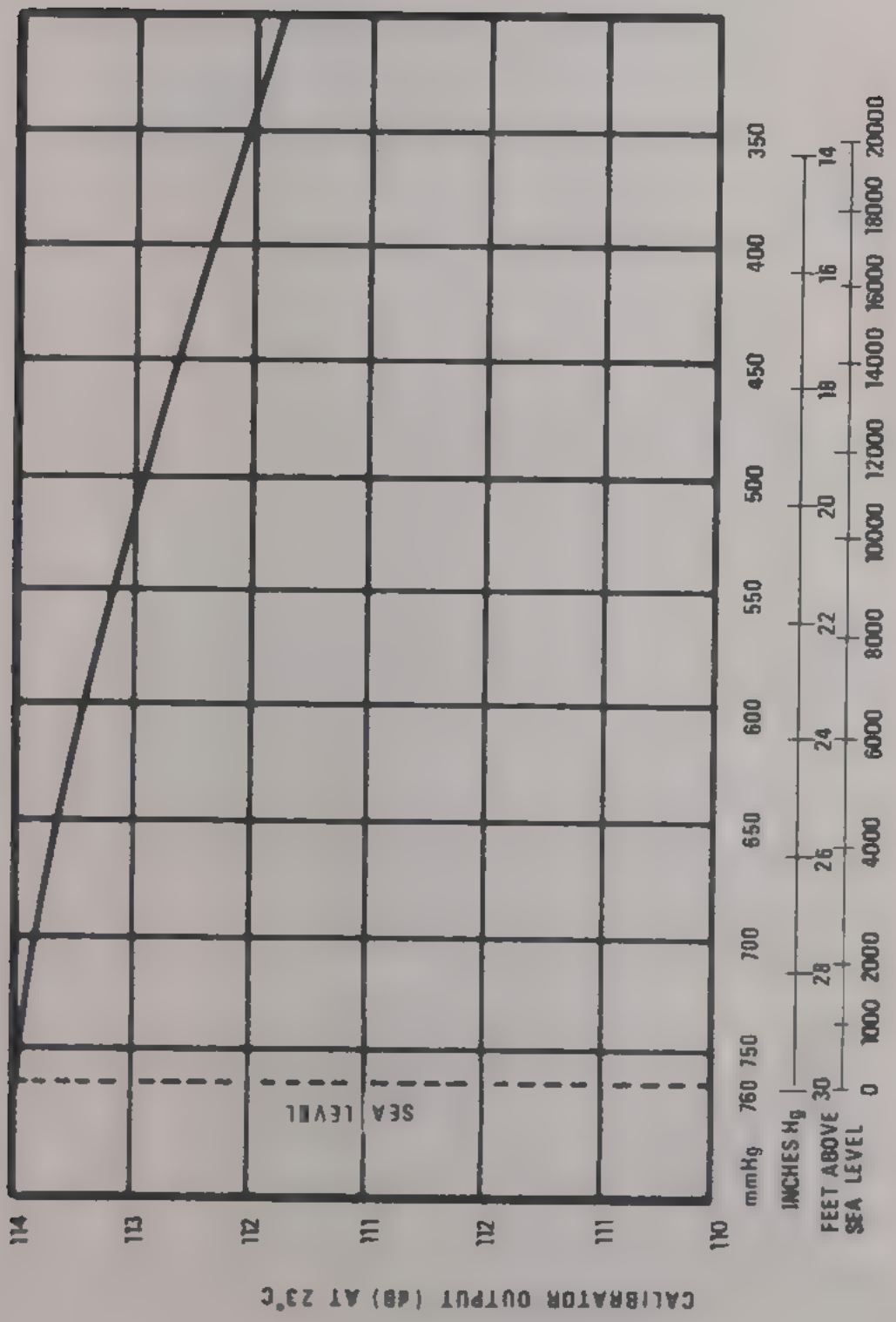

Figure 4-1. Effect of Elevation Upon Calibrator Output

4.4 PRELIMINARY CHECKS

a. Check battery condition by sliding and holding the OFF-ON-BATT TEST switch in the BATT TEST position. The LED will light, indicating that the battery is OK. If it does not light, replace the battery. Refer to paragraph 6.4.

4.4 PRELIMINARY CHECKS

a. Check battery condition by sliding and holding the OFF-ON-BATT TEST switch in the BATT TEST position. The LED will light, indicating that the battery is OK. If it does not light, replace the battery. Refer to paragraph 6.4.

NOTE: An audible output might be obtained with a weak battery. However, any calibration made with the Calibrator will not be valid; therefore, replace the battery immediately.

b. Release the OFF-ON BATT TEST switch. It will return automatically to the ON position. In a quiet environment, the 1000 Hz tone can be heard several feet away.

c. Slide the OFF-ON BATT TEST switch to the OFF position.

4.5 SOUND LEVEL METER SETTINGS

a. Set the range switch to the 110-120 dB range.

b. Set the response switch to the SLOW or FAST position (refer to Operator's Manual Model 884 Sound Level Meter, Table 3-2, item 2).

c. Set the A, B or C weighting switches according to weighting specified for application intended. If weighting is not specified, use C weighting (not applicable for Model 884).

d. Set the power ON/OFF switch to the ON position.

4.6 CALIBRATION OF MODELS 884 and 886 SOUND LEVEL METERS (Refer to Figure 4-2.)

a. Review paragraphs 4.2, 4.3, 4.4 and 4.5. Perform steps indicated and comply with all precautions.

b. Pull off the small metal cap covering the calibration adjustment of the Sound Level Meter.

c. Position the Model 890 over the microphone of the Sound Level Meter. Slowly push microphone as far as possible into cap (for accurate calibration, a closed cavity of fixed volume

must be present between the transducer cap of the Model 890 and microphone).

d. With one hand, hold the Model 890 and the Sound Level Meter against the body and in the horizontal plane, as shown in Figure 4-2.

e. Slide the OFF-ON BATT TEST switch of the Model 890 to the ON position.

f. Observe the meter indication on the Instrument. Its proper reading is 114 dB, within 0.5 dB (if atmospheric and temperature effects are negligible). If it is not, the sound level meter must be calibrated.

NOTE: The factors of atmospheric pressure and ambient temperature must be taken into consideration when observing the meter reading and prior to performing any adjustments (refer to paragraph 4.3).

g. Using the small screwdriver supplied with the Model 890, rotate the CAL adjustment of the Sound Level Meter until the correct dB indication is obtained.

h. Slide the OFF-ON-BATT TEST switch of the Model 890 to the OFF position.

i. Rotate the range switch of the Sound Level Meter to the OFF position.

j. Return the metal cap into the adjustment hole.

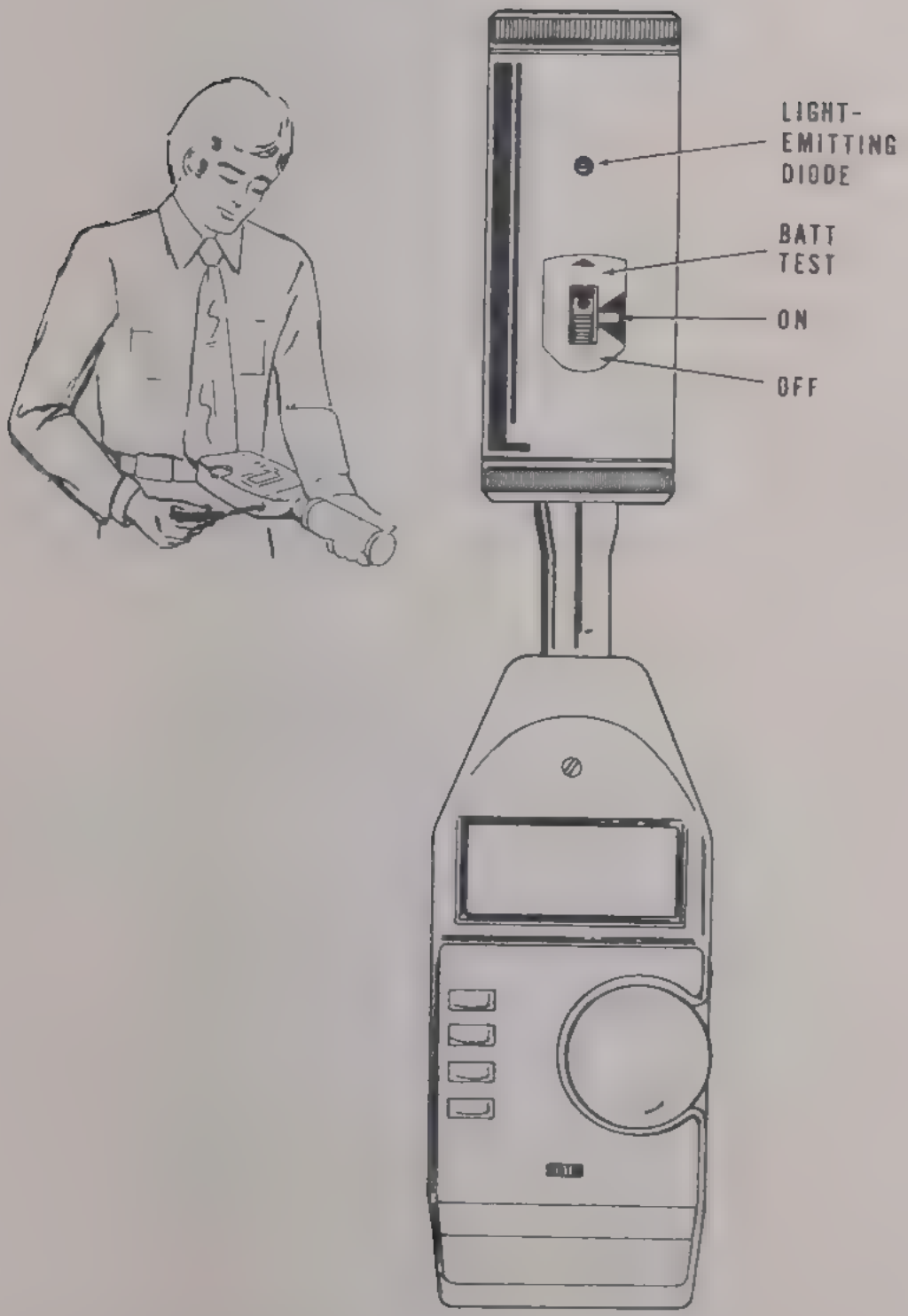

Figure 4-2. Position of the Model 890 and 884/886 for Calibration

SECTION V

THEORY OF OPERATION

5.1 GENERAL

5.1.1 The overall schematic for the Simpson Model 890 Sound Level Calibrator is shown in Figure 7-1.

5.1.2 A 1000 Hz tone is generated by a "twin-T" oscillator formed by Q1, Q2, C2 through C5 and R8 through R15. This signal is fed then to an amplifier (Q6 and Q7) which drives the acoustic transducer. To keep the output level at a constant 114 dB as the 9 volt battery ages, a series-regulated power supply (Q3 and CR2) has been included.

5.1.3 When the OFF-ON-BATT TEST switch is in the BATT TEST position, Q1, Q2, and Q3 are connected as a battery test circuit and the light-emitting diode, CR1, lights if the battery voltage is OK.

SECTION VI

MAINTENANCE

6.1 GENERAL

The Model 890 has been designed carefully and is constructed with high-quality components. By providing reasonable care and following the instructions in this manual, the user can expect a long, useful service life from his Instrument.

CAUTION

Do not permit other than Simpson Authorized Service Centers, or Simpson factory personnel, to disassemble any part of the Instrument other than the battery cap for battery replacement. Replacement of other components can necessitate recalibration, which requires special knowledge and facilities.

6.2 WARRANTY

The Simpson Electric Company warranty policy is printed on the inside back cover of this manual.

Read carefully prior to requesting a warranty repair.

NOTE: For assistance of any kind, including help with the Instrument under warranty, contact your nearest Authorized Service Center for instructions. These are listed on the last pages of the manual. If you wish to contact the factory directly, give full details of the difficulty and include the Instrument model number, and date of purchase. Service data or shipping instructions will be sent to you promptly. If an estimate of charges for non-warranty or other service work is required, a maximum charge estimate will be quoted. This charge will not be exceeded without your prior approval.

6.3 SHIPPING

Pack the Instrument carefully, and ship prepaid to the proper destination. Insure the shipment.

6.4 BATTERY REPLACEMENT

6.4.1 Turn the OFF-ON-BATT TEST switch to the OFF position.

6.4.2 Remove the battery cap (Table 3-1, item 1) by turning it counterclockwise.

6.4.3 Pull battery from the compartment and unsnap the connector.

Note routing of the connector cable with respect to the battery and the indicating instrument.

6.4.4 Snap the battery connector onto the mating terminals of the replacement battery. The connector is polarized so it only can be connected one way.

6.4.5 Put the battery into the battery compartment. Turn the battery so the connector is facing outward. Coil the connector cable neatly on top of the connector so it will not interfere when the battery cap is replaced.

6.5 PREVENTIVE MAINTENANCE

6.5.1 Daily Care:

a. Immediately clean from the Instrument, any spilled material and wipe dry. If spillage is corrosive, use a suitable cleaner to remove spillage and to neutralize corrosive action.

b. Whenever the Instrument is not in use, set the OFF-ON-BATT TEST switch to the OFF position.

c. Avoid prolonged exposure or usage in areas subject to temperature and humidity extremes, vibration, mechanical shock, dust, corrosive fumes, and strong electrical and electromagnetic interference.

d. Be sure the transducer cap is firmly in place.

6.5.2 Monthly Care:

If Instrument has not been used for 30 days, check battery for leakage and replace if necessary.

6.5.3 Annual Care:

It is recommended that the Instrument be returned to the nearest Simpson Authorized Service Center or to the factory annually (sooner if required) for a complete overall check, adjustment and calibration.

6.5.4 Storage:

When the Instrument is not in use, store it in a room free from temperature extremes, dust, corrosive fumes, mechanical vibration or shock. If storage time is expected to exceed 30 days, remove the battery.

6.6 TROUBLESHOOTING

Special training and facilities are required for servicing and calibrating sound level calibrators. Whenever the Instrument does not appear to be functioning properly, send it to your nearest Simpson Authorized Service Center, or return it to the factory.

SECTION VII
REPLACEMENT PARTS, ACCESSORIES, AND SCHEMATIC DIAGRAM

Table 7-1. Items Furnished With the Instrument

Quantity	Description	Part Number
1	Screwdriver	5-116470
1	9 volt battery, NEDA 1604*	
1	Operator's Manual	5-117227

*Available from local retail stores (transistor radio type)

Table 7-2. Accessories and Replacement Parts

Description	Catalog No.
Carrying Case, Vacuum Formed (Houses Model 890 Calibrator and Models 884 or886 Sound Level Meters)	00217
Cap, battery compartment	5-116102
Label, Identification Battery Compartment	5-117226

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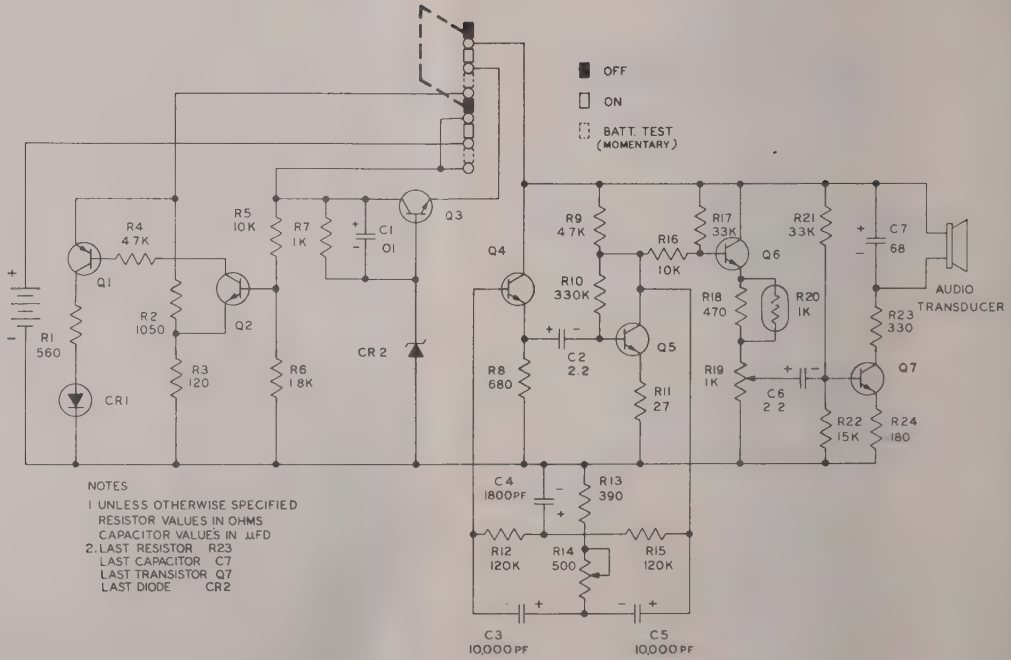

Figure 7-1. Model 890 Sound Level Calibrator, Schematic Diagram

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·· Eicher-Richards Company
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· **WASHINGTON, SEATTLE 98119**
·· The Instrument Lab Inc.
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